

## A review of the *Euthrix laeta* (WALKER, 1855) complex with description of a new species and two new subspecies

(Lepidoptera, Lasiocampidae)

by

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**Abstract:** The *Euthrix laeta* (WALKER, 1855) complex is revised. Excluding the nominotypical one, 4 more subspecies are recognized and one of them, *E. laeta arina* **subspec. nov.** is described from Taiwan (type locality: Taiwan, Prov. Nan-Tou, 3 km S Hoshe, Yu-Shan Nat. Park, 1400 m). Populations from Java and Bali are considered as a new species, *Euthrix morra* **spec. nov.** (type locality: Central Bali, Bedugul District, Tamblingan N. P., 1200 m, 08°14'S; 115°08'E) with a new subspecies, *E. morra floyana* **subspec. nov.** (type locality: Ost-Java, Meru Betiri National Park, 25 km S Dorf Kalibaru, 300-500 m). A lectotype ♂ for *Cosmotriche laeta* WALK. var. *sulphurea* AURIVILLIUS, 1894 is designated here from RMS. A relationship between the subspecies *E. l. sulphurea* AUR. and *E. laeta austrina* (DE LAJONQUIÈRE, 1978), based on molecular analysis, is discussed shortly.

**Introduction:** The colourful species *Euthrix laeta* (WALKER, 1855) is well known and, thus far, has been considered as being taxonomically stable since a revision by DE LAJONQUIÈRE (1977). Four subspecies are recognized, and one more is considered to be a synonym. The species has been accepted as a member of its own subgenus, the *Routlegdia* TUTT, 1902, and erroneously as the *Orientrix* TSCHISTIAKOV in 1998. Further problems have now become obvious. The first one is to decide the status of some insular populations, eg. of Taiwan, Java and Bali. The second is to outline the limits between subspecies more precisely. This article is devoted to elucidating these problems.

A new species of the group was noticed during the revision of the complex. It was found to be a local endemic to Java and Bali, where it allopatrically to the widely distributed *E. laeta* (Wlk.) Furthermore, a description of a new subspecies from Taiwan is included in this review.

**Material and methods:** Approximately 400 specimens were examined from the following collections:

BMNH: Natural History Museum, London, UK (formerly British Museum of Natural History);

CAHU: ARMIN HAUENSTEIN, Untermünkheim, Germany;

CMNH: Carnegie Museum of Natural History, Pittsburgh, USA;

CMSW: MANFRED STRÖHLE, Weiden, Germany;

CVZU: VADIM ZOLOTUHN, Ulyanovsk, Russia;

HDOU: Hope Department of the Oxford University;

ISNB: Koninklijk Belgisch Instituut voor Natuurwetenschappen (Bruxelles, Belgique) [Institut royal des Sciences naturelles de Belgique];

MHNG: Musée d'histoire naturelle, Geneve, Switzerland;

MHUB: Zoologisches Museum der HUMBOLDT Universität, Berlin, Germany;

MNHN: Musée National d'Histoire Naturelle, Paris;

MWM: Museum WITT, Munich, Germany;

NSMT: National Science Museum, Tokyo, Japan;

RMS: Naturhistoriska Riksmuseet Stockholm;

ZFMK: Zoologisches Forschungsinstitut und Museum Alexander KOENIG, Bonn;

ZISP: Zoological Museum of Russian Academy of Sciences;

ZSM: Zoologische Staatssammlung, Munich;

ZMKU: Zoological Museum of Kiev University.

From the above-mentioned material, a total of about 40 genitalia dissections were made using standard techniques and mounted in Euparal on glass slides. The illustrations were all based on Euparal mounted preparations and photographed under magnification using an Olympus Camedia C-750 Camera with Soligor Adapter Tube for Olympus and Slide Duplicator for Digital 10 Dptrs modified for object lenses. The plates were produced by A. PEREKRASNOV using CorelPhotoPaint X3 from photographs taken by A. PEREKRASNOV, B. GUSTAFSSON and V. ZOLOTUHN. The photographs of the adult type specimens have not been altered, but in some of the genitalia illustrations dissecting damage and the position of separate parts has been digitally reconstructed, taking special care with regard to maintaining their original proportions. The maps were compiled by A. PEREKRASNOV using the same CorelPhotoPaint X3. The type location is indicated by a star marker if known exactly, while all others are represented by circles.

Label data of type specimens are quoted verbatim, while the month of capture or hatch-time of the adult is given in Roman numerals.

The species was described as *Amydona laeta* WALKER. This attribution is quite different from *Euthrix* MEIGEN, 1830, genus *Amydona* WALKER, 1855 [December 8], a synonym to *Trabala* WALKER, 1856 and a junior homonym of *Amydona* WALKER, 1855 [November 10] in Lepidoptera, Limacodidae - this was perhaps because of a distinct scale pillow on the tip of the ♀ abdomen. This character generally is really not typical for most members of the *Euthrix* MEIGEN. The contradiction was removed by TUTT (1902) who offered a separate genus, the *Routlegdia* TUTT. This point of view was not followed by subsequent researchers and the species was included further in the *Cosmotriche* HÜBNER, [1820] 1816, *Philudoria* KIRBY, 1892, or *Euthrix* MEIGEN, 1830, accordingly to the point of view dominant at the corresponding time. 2 colour forms were also described at that time - very dark from Ceylon and light yellow from the Far East. Only a detailed analysis was undertaken by DE LAJONQUIÈRE (1979) who used the genitalic characters to separate

populations and described a new subspecies from Sundaland, *E. l. austrina* LAJ. At the same time a very distinct character (namely serrated tergal lobes) was oddly overlooked by him. 20 years later, TSCHISTIAKOV (1998) raised all subspecies of *E. laeta* (Wlk.) into separate species joined in the newly described genus *Orienthrix* TSCHISTIAKOV. The situation was specially considered by ZOLOTUHIN (2001) and *Orienthrix* TSCHISTIAKOV, 1998, was considered to be junior objective synonym of *Routledgeia* TUTT, 1902, and junior subjective synonym of *Euthrix* MEIGEN, 1830.

The moths of the complex *E. laeta* (Wlk.) are medium to large sized lasiocampids with a wing span in ♂♂ of 33-55 mm and 50-70 mm in ♀♀. Sexual dimorphism is limited to the ♀♀ being just larger and more robust, the antennae being bipectinated in both sexes, but with shorter rami in the ♀♀ which also have the pillow of pointed scales on the tip of abdomen. Fore tibia with short ellipsoid epiphysis.

The moths are predominantly of a bright lilac-reddish ground colour with a distinct yellow field, sometimes with a strong violet saturation; the population of Ceylon is distinctly darker. Postmedian fascia oblique, almost diagonal, slightly curved basally; antemedian fascia weak and indistinct. A pair of large white discal spots, one under the other, is very typical for each fore wing; the lower spot is often covered with reddish scales and less prominent. Hind wings with distinctly divided lighter and darker zones. There is wide variation in colouration and saturation but moths are easily recognizable in nature without special experience.

♂ genitalia (figs. 1-9): Uncus and gnathos reduced as in other members of the subfamily. Socia distinct, membranous to very weakly sclerotized, with long setae, taking a lateral position on tegument. Valvae strongly modified, heavy sclerotized, divided into two narrow tubular lobes; the lower one broader, with widened base, and the upper one stick-shaped, straight or slightly S-shaped. The presence of strong tergal lobes coming up from basal part of tegument and looking like valva processes are very characteristic. Shape of these lobes quite distinct in different subspecies; they are flattened or fluted, often curved and with a swollen base. It is covered from inside with a thin membrane which is more or less distinct in different populations. Vinculum narrow, semicircular shaped; distal processes of vinculum always distinct, paired, fork-shaped, more or less C- or S-curved. Juxta is a short trench, completely grown together with the base of aedeagus. Aedeagus slender, heavy sclerotized, C-shaped, with pointed apex. Opening of vesica situated mostly dorso-lateral and supplied by a toothed crest. Vesica short, without cornuti. VIII sternite is also slightly modified but not as stark as in other members of *Euthrix*. Its shape can be useful in identification.

♀ genitalia (figs. 10-18): Papilla analis short, domed; apophysis posterioris slender and long, much longer than apophysis anterioris. Both vaginal plates present. Antevaginal plate strongly sclerotized, high, with small caudal triangular cut; postvaginal plate looks like a narrow arched and banded roof above ostium with varying height and width in different subspecies. Ostium deep, sclerotized, lays in a deep broad sinus; anthrum strongly sclerotized, hemispherical, with narrow slit. Ductus bursae short, sometimes indistinct, corpus bursae pear-shaped, with caudal scobination and distinct rhomboid signum (reduced in the Taiwan population and absent in Java and Bali populations).

**Early stages.** Egg: The spherical eggs have a micropylar pole on the side. The colouration of chorion differs in different populations from a patternless rose colour in the Far East to a porcelain white with greenish spots in Vietnam. The eggs are laid in small clusters and covered by abdominal scales more or less densely according to the latitudes and the average winter temperature.

Larva (colour plate 13: 1-3): The larvae are cylindrical, not flattened dorso-ventrally, without protruding verrucae or transversal setose thoracic bands or lateral lappets, and with 2 types of setae. One of them is long, elastic, and sparsely haired all over the body, with two hair tufts caudally and cranially. Another one has small blackish chetae grouped dorsally and dorso-laterally into short protruding tufts giving a characteristic appearance to the caterpillar. The mesothorax bears a dorso-median pencil of black setae anterior to a pale one. Segment A8 has an erect brush of dark grey setae. Intervening segments have short dorsal black to dark brown tufts that typically on each segment consist of anteriorly converging but separate lines, each with four or five tufts. The upper lateral protuberance of T1 has a diffuse pencil of black and pale setae. Ground colour brown to ash-grey, dorsally the caterpillars are speckled with black and grey, white or off-white or yellow spots and streaks grouped into a complete marble pattern. There are no distinct verrucae. The caterpillars are solitary.

Pupation: Takes place in an elongated whitish papery cocoon attached to the host plant. The stage lasts about 20 days in the Far East of Russia (pers. obs.).

**Biology:** The biology of the species is poorly known. *Euthrix l. sulphurea* AUR. s. str. from the Far East of Russia, northern China and Korea, develops a single generation each year; eggs are the overwintering stage. The caterpillars hatch in May and feed on bush Fabaceae; *Lespedeza* and *Dalbergia* are known host plants. Southwards, the species develops 2 or 3 generations, partly overlapping, but its biology is not known in detail. It was said to feed "on grasses" in India (DUGDEON, 1901), but this is surely a mistake because different species were listed as *E. laeta* (Wlk.) at that time and some of them accept Poaceae as hosts.

**Distribution** (maps 1, 2): The species is distributed from the Himalayas Range (Pakistan and northern India) to south India including Sri Lanka, Nepal, Bangladesh, China, Russian Far East, Korea and south-east Asia to Sumatra, Borneo, Balabac and Palawan. Five subspecies are considered within the species, one of them being described here as a new one. Populations in Java and Bali are considered to be a separate (new) species.

#### Systematic account

*Euthrix laeta* (WALKER, 1855)

*Euthrix laeta laeta* (WALKER, 1855)

*Euthrix laeta sulphurea* (AURIVILLIUS, 1894)

*Euthrix laeta austrina* (DE LAJONQUIÈRE, 1978)

*Philudoria laeta austrina* f. *fusca* DE LAJONQUIÈRE, 1978

*Euthrix laeta divisa* (MOORE, 1879)

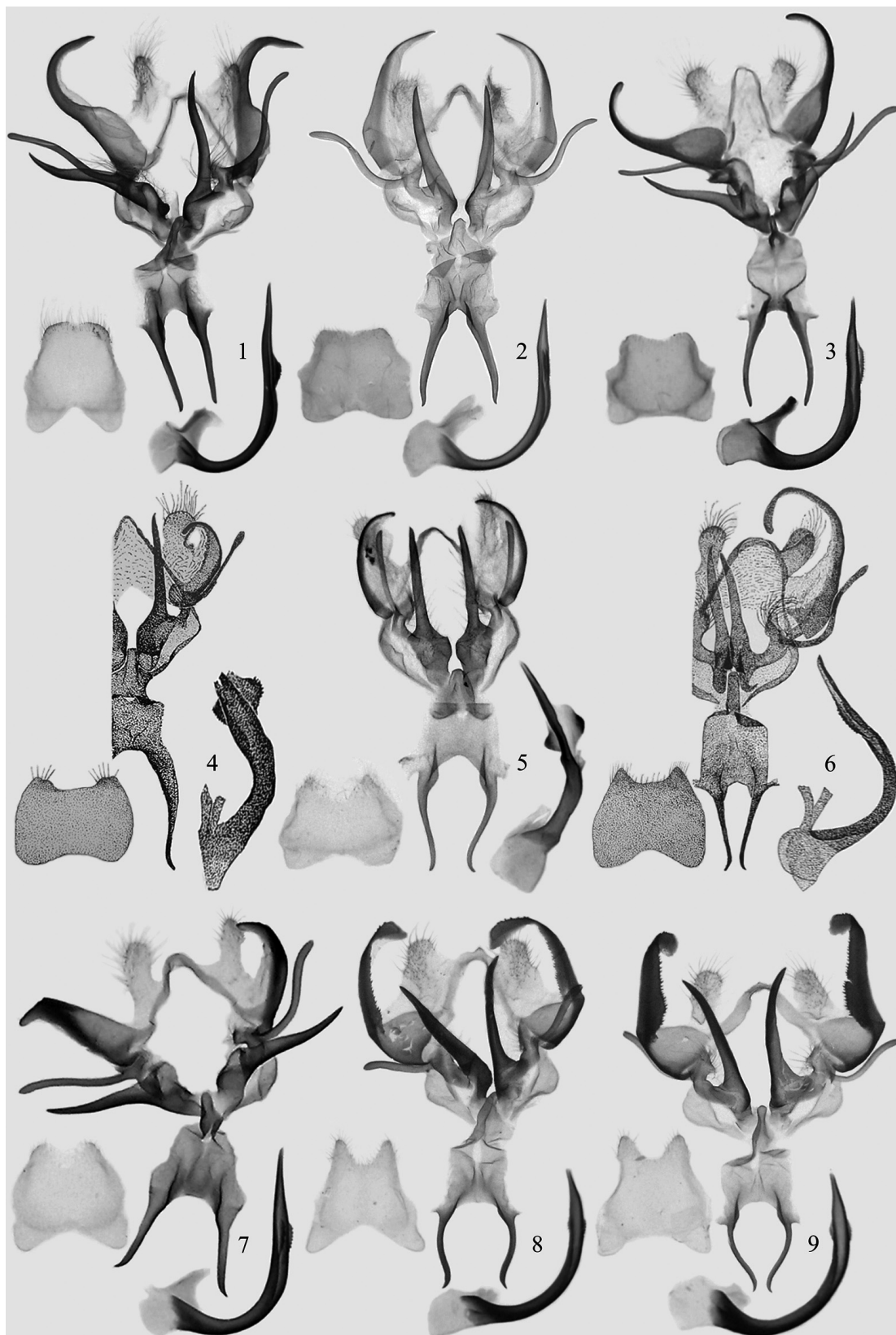
*Cosmotriche purpurascens* HAMPSON, 1893

*Euthrix laeta arina* ZOLOTUHIN & PEREKRASNOV **subspec. nov.**

*Euthrix morra* ZOLOTUHIN & PEREKRASNOV **spec. nov.**

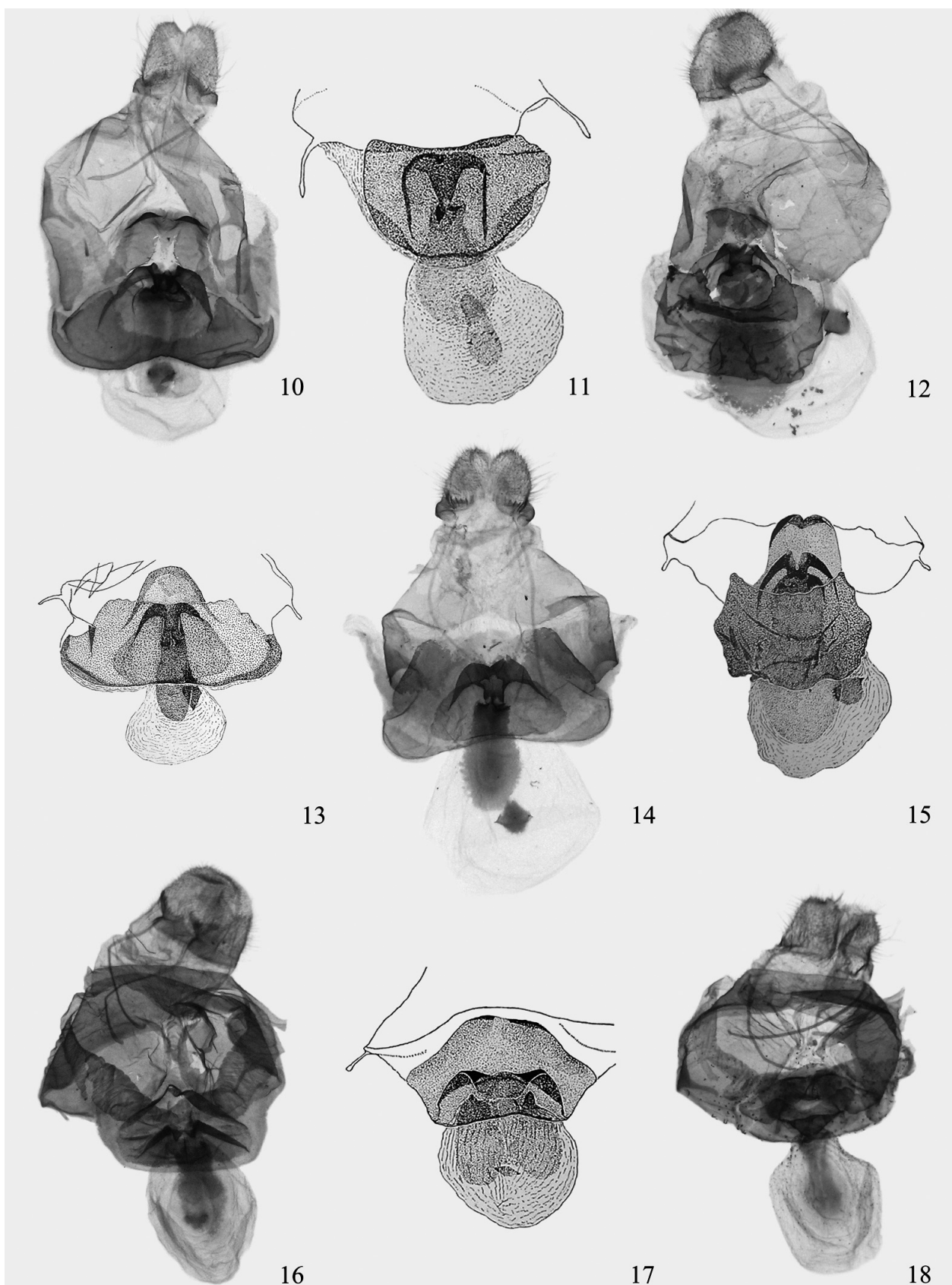
*Euthrix morra morra* ZOLOTUHIN & PEREKRASNOV **spec. nov.**

*Euthrix morra floyana* ZOLOTUHIN & PEREKRASNOV **subspec. nov.**

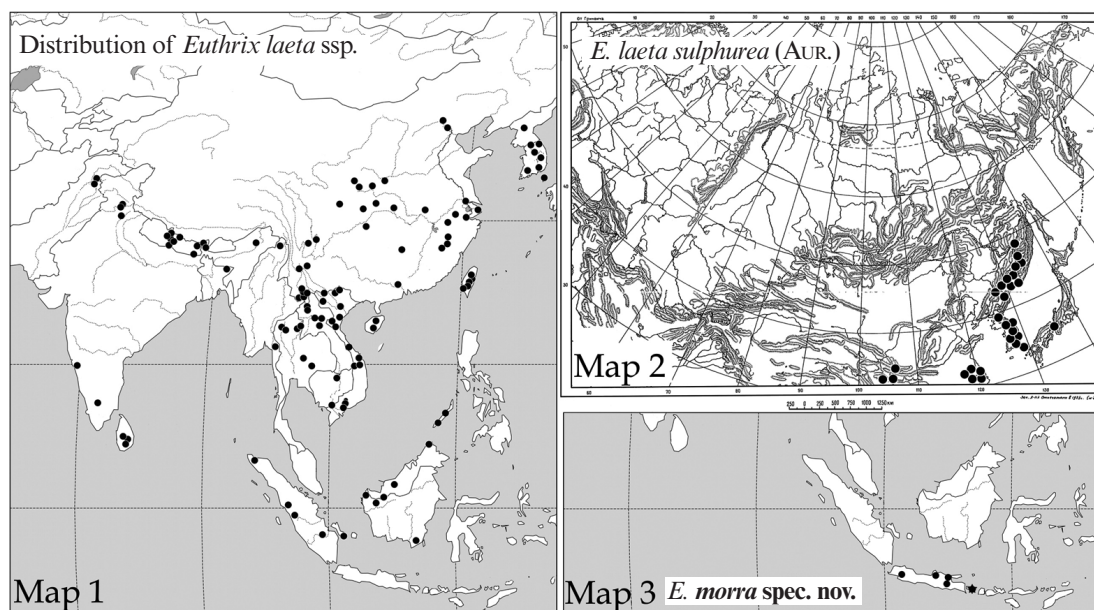


Figs 1-9. ♂♂ genitalia. (1) *Euthrix laeta laeta* (WALKER, 1855), C. Nepal, Pokhara, 1600 m, 83°59'E - 28°14'N, 1.VII.1995, leg. E. AFONIN & V. SINJAEV (GU-14.571, MWM). (2, 3) *Euthrix laeta sulphurea* (AURIVILLIUS, 1894), (2) China, Chekiang (GULAJ-164, ZFMK); (3) N. Vietnam, Ben En Nat. Park, 200 m, 40 km SW Than Hoa, 105°40'E - 18°40'N, 22.-30.XI.1994, leg. SINJAEV & SIMONOV (MWM). (4, 5) *Euthrix laeta divisa* (MOORE, 1879), (4) Ceylon (from DE LAJONQUIÈRE, 1978); (5) Ceylon, World's End, S-side, 80°51'E - 06°46'N, 1100 m, 1.IV.1997, leg. SCHINTLMEISTER & SINJAEV (GU-13.712, MWM). (6) *Euthrix laeta austrina* (DE LAJONQUIÈRE, 1978), holotype, Sumatra, Lebong Tandai, 1-2.I.1922, leg. C. J. BROOKS (GU-L.11-77, BMNH) (from DE LAJONQUIÈRE, 1978). (7) *Euthrix laeta arina* *subspec. nov.*, paratype, Taiwan, Prov. Nantou 3 km E of Tili, 120°58'E-23°47'N, 555 m, 27.-28.V.1997, leg. C. SZABOKY & I. SOOS (MWM). (8) *Euthrix morra* *spec. nov.*, paratype, Central Bali, Bedugul District, Tamblingan lakes, 1200 m, 115°08'E-08°14'S, XI.2004, leg. St. JAKL (GU-17.714, MWM). (9) *Euthrix morra floyana* *subspec. nov.*, paratype, Java, Meru Betiri National Park, 25 km S Dorf Kalibaru, 300-500 m, V-VI.1996 (GU-13.713, MWM).





Figs 10-18: ♀♀ genitalia. (10, 11) *Euthrix l. laeta* (WALKER, 1855), (10) Indien, Sikkim, 14 km nordl. Gangtok, 1.500 m, 2.VII.1989, leg. W. THOMAS (GU-14.571, MWM); (11), lectotype, Assam (from DE LAJONQUIÈRE, 1978). (12, 15) *Euthrix laeta sulphurea* (AURIVILLIUS, 1894), Russia, Primorye, Far East, Barabash-Levada, 131°25'E, 44°46'N (GU-14.572, MWM); (15): China, Chekiang (from DE LAJONQUIÈRE, 1978). (13, 14, 16). *Euthrix laeta arina subspec. nov.*, allotype, Sarawak (from DE LAJONQUIÈRE, 1978); (14) Borneo, Prov. Sabah Mt. Trus Madi bei Apin Apin, 1080 m, 21.III.-12.IV.2006, leg. K. MARTINI (GU-14.574, MWM); (16) paratype, Taiwan, Kaoshiung, 120°52'E, 23°17'N, 2.VI.1997, leg. C. SZABOKY & I. SOOS (GU-13.711, MWM). (17) *Euthrix laeta divisa* (MOORE, 1879), holotype, Ceylan (from DE LAJONQUIÈRE, 1978). 18. *Euthrix morva spec. nov.*, paratype, Central Bali, Bedugul District, Tamblingan lakes, 1200 m, 115°08'E, 08°14'S, XI 2004, leg. St. JAKL (GU-17.710, MWM).



#### An annotated check-list

##### *Euthrix laeta laeta* (WALKER, 1855) (colour plate 12: 1-3)

*Amydona laeta* WALKER, 1855, List Spec. lepid. Ins. Colln Br. Mus. 6: 1416. Locus typicus: [Bangladesh] Silhet. Lectotype (designated by DE LAJONQUIÈRE, 1978): ♀ (BMNH) [examined].

**Description:** Wing span 50-55 mm in ♂♂ and 60-63 mm in ♀♀, and fore wing length correspondingly 22-26 and 31-33 mm. Ground colour is generally reddish brown with more or less contrasting colour fields: brown apical, yellow cubito-anal and rose greyish submarginal. Discal spots rounded, yellowish and brown in ♂♂ or whitish and brown in ♀♀. Hind wings brownish rose with darker frontal margin.

♂ genitalia (fig. 1): Socia narrowed apical. The lower lobe of valva slightly S-shaped. Tergal lobes strongly S-shaped, with highly swollen base and pointed apex; its swollen basal part distinctly separated from a more slender proximal one. Distal processes of vinculum almost parallel, straight. Aedeagus slender, with distinctly pointed apex and dorsal opening of vesica supplied by a small toothed crest. VIII sternite with almost straight caudal margin.

♀ genitalia (figs 1, 2): Antevaginal plate high, with small caudo-lateral pockets; postvaginal plate narrow medially and broadened on the sides. Ostium deep, sclerotized, with wrinkled dorsal wall; bursa copulatrix with weak scobination and distinct rhomboid signum.

**Diagnosis:** Large subspecies with contrast ground colour. Very bright specimens are typical, although sometimes this bright coloration is a more uniform lilac-grey. In ♂ genitalia, valvae broad and pointed apically are typical.

**Bionomics:** Mountain subspecies. The moths are on the wing from June to October, so it develops 1-2 generations per year. Inhabits altitudes of 1300-1900 m. The larva was recorded on *Dalbergia* (Fabaceae) (GARDNER, 1941; BROWNE, 1968); records on grass need confirmation. The larva was described by HAMPSON (1892) and GARDNER (1941).

**Distribution** (map 1): Northern India, Pakistan, Nepal, and Bangladesh.

##### *Euthrix laeta sulphurea* (AURIVILLIUS, 1894) (colour plate 12: 4-7)

*Cosmotriche laeta* WALK. var. *Sulphurea* AURIVILLIUS, 1894, Dt. Ent. Z. Iris 7: 164. Locus typicus: [Russia] Amur. Lectotype: male (RMS), here designated.

**Description:** Wing span 50-53 mm in males and 67-70 mm in ♀♀, and fore wing length correspondingly 23-26 and 32-35 mm. Similar externally to the nominate subspecies but lighter and darker coloured specimens with a predominance of dark lilac colour are known only among southern populations. Antemedian fascia distinct.

♂ genitalia (figs 2, 3): Socia parallel-sided. The lower lobe of valva very slightly S-shaped. Tergal lobes strongly S-shaped, with highly swollen base and rounded apex; the swollen base passes gradually into a more slender proximal one. Distal processes of vinculum almost straight, closed at the base but separated cranially forming a kind of tweezers. Aedeagus slender, with distinctly pointed apex and dorso-lateral opening of vesica on the left side supplied by a low toothed crest. VIII sternite with distinct caudal narrowing and small ovoid caudal cut.

♀ genitalia (fig. 12). Antevaginal plate high, without caudo-lateral pockets; postvaginal plate broad, without medial narrowing but with distinct cut opening ostium and with wrinkled outer edge. Ostium deep, sclerotized, with wrinkled dorsal wall bearing some small pockets; bursa copulatrix with distinct ovoid scobination and rhomboid signum.

**Bionomics:** The biology is well known only for the northern populations, where the species develops one generation per year; eggs are the hibernating stage and caterpillars feed on arboreous Fabaceae (*Lespedeza bicolor* and *Dalbergia*) in May and June. Pupation from early July, which lasts about 20 days. Adults are on the wing from late July to early September. The species is univoltine over most its range and only southwards in Sichuan and Yunnan is two or probably three generations developed. 2 generations are the minimum in Vietnam and Thailand, with moths flying in February-May and September-November; it is on the wing in Thailand from July to February. Inhabits altitudes of 130-2000 m. The larva was figured, also from Internet resources (col. pl. 13: 1-3).

**Distribution** (maps 1, 2): Far East of Russia, Korea, North-eastern China (Heilongjiang, Hebei, Beijing), and southern Japan (Tsu-

shima isl.). The populations of Central and Southern China (Hubei, Hunan, Guangdong, Jiangsu, Shanghai, Zhejiang, Hainan, Jiangxi, Fujian, Yunnan, Sichuan, Shaanxi, Gansu), Myanmar, Laos, Thailand, Vietnam are also attributed to this subspecies (see lower under Comments).

In Japan it is recorded now only from the small island Tsushima close to Korea but a ♂ specimen collected from Tsuruga in July 1886 by LEECH [Honshu, Fukui Pref.] is also kept in the BMNH. It may be a result of a chance meeting or the species could really inhabit Honshu but is very local there.

#### Comments:

1. *Euthrix laeta sulphurea* (AURIVILLIUS, 1894) was described after an uncertain number of specimens of both sexes originating from Amur. A sample of 5 specimens (2 ♂♂, 2 ♀♀ and 1 dried caterpillar) labeled “Amur” was found in RMS (BERT GUSTAFSSON, pers. comm. from 5.IX.2008). From them, a ♂ in fine condition has been selected here as a lectotype of the taxon (col. pl. 12: 5). It bears the following labels: large yellowish, black framed rectangle with inscription (in black ink) with AURIVILLIUS's hand “*Lasiocampa laeta*”, small yellowish rectangle with printed “STAUDINGE[R]”, small yellowish rectangle with printed “Amur”. It is supplied with an additional red rectangular label with black frame and printed text: “Lectotype, ♂. *Cosmotriche laeta* WALK. var. *Sulphurea* AURIVILLIUS, 1894. des. ZOLOTUHIN & PEREKRASNOV”. Other specimens can be considered therefore as paralectotypes of the taxon.
2. The populations in Vietnam, Laos and Thailand were attributed to *E. laeta austrina* (DE LAJONQUIÈRE, 1978) for a long time. It was originally described from Sumatra and was considered to be distributed through Sundaland, including Java and Bali, and continental south-east Asia. Recently, the DNA was studied for some *Euthrix* MEIGEN species and sequences for *E. laeta* from Russian Far East, northern and Central Vietnam were analyzed (EFIMOV et al., 2007 [2008]). The samples were found very closely related, and no differences at a subspecific level were shown between them, therefore the populations from the range are all attributed to *E. l. sulphurea* (AUR.). To define this problem more precisely, the DNA for the Sumatran population needs further study; and minor morphological differences between populations of Russia and Vietnam (eg. different phenology and different colouration of the eggs' chorion) make their status as the same subspecies still questionable. The population is named *sulphurea* AURIVILLIUS, 1894, due to priority.

#### *Euthrix laeta divisa* (MOORE, 1879) (colour plate 12: 8-11)

*Odonestis divisa* MOORE, 1879, Proc. Zool. Soc. London **1879**: 408. Locus typicus: Ceylon. Holotype: ♀ (BMNH) [examined].

*Cosmotriche purpurascens* HAMPSON, 1893, Ill. typic. Specim. Lepid. Het. Colln. Br. Mus. **9**: 74, pl. CLX, fig. 10. Locus typicus: Ceylon. Holotype: ♂ (BMNH) [examined].

**Description:** Small subspecies, wing span 45-50 mm in ♂♂ and 52-65 mm in ♀♀, and fore wing length correspondingly 18-20 and 25-28 mm. Wings uniform dark pinkish brown to dark chestnut-red; hind wings distinctly bicolorous with distinct sharp border between colours - dark pinkish brown costal area and rest yellowish cream. Postmedian fascia curved in anal field of the fore wing, fine, pale-bordered. Discal spots ovoid to round, pearly-whitish with brown scales inside or completely covered with brown scales (in ♂♂); the upper smaller spot white without brown scale cover. The darkest and uniformly coloured subspecies.

♂ genitalia (figs. 4, 5): Socia distinct, circular. The lower lobe of valva strong, straight, with prominent swollen base. Tergal lobe strongly C-shaped, very narrow, shorter than in other subspecies, with base not swollen but with a membranous fold which fuses their inner surface and tegument. Distal processes of vinculum S-shaped, separated basally, looking like an oven fork. Aedeagus more robust than in other subspecies, with dorso-lateral opening of vesica absent on right side and supplied by prominent and spread wide toothed crest from both sides. VIII sternite with distinct caudal cut.

♀ genitalia (fig. 17): Antevaginal plate low, with indistinct caudo-lateral pockets; postvaginal plate weakly sclerotized. Ostium deep, sclerotized, with dorsal pockets; bursa copulatrix with indistinct ellipsoid scobination and small diffuse signum.

**Bionomics:** The biology is almost unknown. A few specimens kept in collection bear “February”, “April”, “July” on the labels, if anything. The subspecies inhabits altitudes of 1000-1100 m. Nothing is reported about the host plant and the larva.

**Distribution** (map 1): Sri Lanka (Kandy, Madulsima, Belihuloya, Haldamulla, World's End), and southern India (Tamil Nadu).

#### *Euthrix laeta austrina* (DE LAJONQUIÈRE, 1978) (colour plate 12: 12-14)

*Philudoria laeta austrina* DE LAJONQUIÈRE, 1978, Ann. Soc. ent. France **14** (3): 396, pl. 1 N, figs 11, 32. Locus typicus: Sumatra, Lebong Tandal. Holotype: ♂ (BMNH) [examined].

*Philudoria laeta austrina* f. *fusca* DE LAJONQUIÈRE, 1978, Ann. Soc. ent. France **14** (3): 396, pl. 1 M, pl. 3 J. Locus typicus: SO Sumatra, 5000', North Korintji Valley. Holotype: ♂ (BMNH) [examined].

**Description:** Wing span 33-46 mm in ♂♂ and 50-58 mm in ♀♀, and fore wing length correspondingly 18-22 and 27-31 mm. Ground colour varies from dark rose to dark grey, with large and distinct reddish and yellow fields. Discal spots silver. Similar externally to the nominate subspecies but generally smaller and more contrastingly patterned; fore wings with distinctly pointed apex.

♂ genitalia (fig. 6): Socia distinct, circular. The lower lobe of valva strong, straight, without swollen base. Tergal lobe strongly C-shaped, very narrow, very long (the longest within the species), with base a little swollen and with a membranous fold which fuses their inner surface and tegument. Distal processes of vinculum slender, short, almost straight, with curved apex, separated basally and closed together apically. Aedeagus strongly curved, with dorso-lateral left opening of vesica supplied with a low crest. VIII sternite gradually narrowing to a tip with distinct caudal cut.

♀ genitalia (figs. 13, 14): Antevaginal plate almost invisible, without any pockets; postvaginal plate broad, without distinct medial narrowing and with wrinkled outer edge. Ostium deep, sclerotized, with wrinkled dorsal wall bearing large caudal pockets; bursa copulatrix with distinct ovoid scobination and somewhat diffuse rhomboid signum with indistinct lateral spines.

**Bionomics:** The biology is poorly known. The subspecies seems to be bi- or polyvoltine; moths have been recorded in every month of the year. In Borneo the species is infrequent in the lowlands, and is taken in rainforest and coastal locations; in Sumatra it inhabits altitudes up to 1600 m. Nothing is known about its host plants.

**Distribution** (map 1): Sumatra, Borneo, Palawan, Balabac; and ?Malay Peninsular. The subspecies was also listed from Java and some paratypes were designated from there but really it is replaced there by a separate species (is described as *Euthrix morra spec. nov.* here). See also under *E. laeta sulphurea* (AUR.).



*Euthrix laeta arina* spec. nov. (colour plate 12: 15-17)

Holotype ♂ (col. pl. 12: 16): Taiwan, Prov. Nan-Tou, 3 km S Hoshe, Yu-Shan Nat. Park, 1400 m, 16.X.1996, leg. Gy. FABIAN & F. NEMES (MWM).

Paratypes: 6 ♂♂, Taiwan: Kaohsiung, Shanping, 640 m, 1.-10.V.1988, R. DAVIDSON, C. YOUNG, J. RAWLINS (CMNH); 6 ♂♂, Taiwan: Kaohsiung, Shanping, 640 m, 11.-20.IV.1988, R. DAVIDSON, C. YOUNG, J. RAWLINS (CMNH); 1 ♂, Taiwan: Kaohsiung, Shanping, 640 m, 21.-30.IV.1988, C. YAVIDSON, C. YOUNG, J. RAWLINS (CMNH); 2 ♂♂, Taiwan, Kaohsiung, Shanping, 640 m, 23.-31.III.1988, J. RAWLINS, C. YOUNG (CMNH); 1 ♂, Taiwan, Kaohsiung near Tuona, 12 km SE Shanping, 750 m, 12.-13.V.1988, R. L. DAVIDSON (CMNH); 2 ♂♂, Taiwan, Prov. Nantou, 16 km E of Kuohsing, 121°00'E; 24°05'N, 560 m, Ursun Forest, 8.VI.1997, leg. C. SZABOKY & I. SOOS (MWM); 1 ♂, Taiwan, Prov. Kao-Hsiung, 15 km NE Taoyuan, 1850m, 7.VII.1996, leg. G. CSORBA & L. NEMETH (MWM); 1 ♂, Taiwan, Prov. Ping-Tung, 10 km SE of Mutan, 470 m, 3.-4.VII.1996, leg. G. CSORBA & L. NEMETH (MWM); 4 ♂♂, 1 ♀, Taiwan, Prov. Nan-Tou, 3 km S Hoshe, Yu-Shan Nat. Park, 1400 m, 16.X.1996, leg. Gy. FABIAN & F. NEMES (MWM); 3 ♂♂, Taiwan, Prov. Nantou, 3 km E of Tili, 555 m, 16.XI.1996 (120°58'E; 23°47'N), leg. T. CSOVARI & C. SZABOKY (MWM); 1 ♂, Taiwan, Prov. Nantou, 3 km E of Tili, 120°58'E; 23°47'N, 555 m, 27.-28.V.1997, leg. C. SZABOKY & I. SOOS (MWM); 1 ♂, Taiwan, Prov. Nantou, 3 km E of Tili, 555 m, 28.VI.1997 (120°58'E; 23°47'N), leg. CSOVARI & MIKUS (MWM); 1 ♂, Taiwan, Prov. Nantou, Ursun F., 16 km E of Kuohsing, 560 m, 29.-30.X.1996 (121°00'E; 24°05'N), leg. T. CSOVARI & C. SZABOKY (MWM); 2 ♂♂, Taiwan, Prov. Nantou, 3 km SW of Tsuifeng, 2100 m, 20.X.1995, 121°10'E; 24°06'N, leg. CSOVARI & STEGER (MWM); 3 ♂♂, Taiwan, Prov. Nantou, Ursun F., 16 km E of Kuohsing, 560 m, 24.VI.1997 (121°00'E; 24°05'N), leg. CSOVARI & MIKUS (MWM); 1 ♂, Taiwan, Prov. Kaoshiung, 26 km SE of Taoyuan, 1370 m, 29.VI.1997 (120°52'E; 23°17'N), leg. CSOVARI & MIKUS (MWM); 2 ♂♂, Taiwan, Prov. Kaoshiung, 26 km SE of Taoyuan, 1370 m, 2.VI.1997 (120°52'E; 23°17'N), leg. C. SZABOKY & I. SOOS (MWM); 1 ♂, 1 ♀, Taiwan, Prov. Kaoshiung, 26 km SE of Taoyuan, 1370 m, 4.XI.1996 (120°52'E; 23°17'N), leg. T. CSOVARI & C. SZABOKY (MWM); 1 ♂, Taiwan, Prov. Nantou, 17 km E of Kuohsing, 121°00'E; 24°05'N, 560 m, Ursun Forest Camping, 6.-7.VI.1997, leg. C. SZABOKY & I. SOOS (MWM); 5 ♂♂, Formosa, Kanshirei, 1000 ft, 19.IV.1908, A. E. WILEMAN (BMNH).

**Description:** Wing span 45-55 mm in ♂♂ and 60-64 mm in ♀♀, and fore wing length correspondingly 22-25 and 30-32 mm. Two colour forms are present. One of them is very similar to *E. l. austrina* (DE LAJ.), but the other is typical only for Taiwan. The ground colour of the latter is from dark lilac to ash lilac, with large but not so distinct reddish and yellow fields. Discal spots white, with brownish central covering, and black border.

♂ genitalia (fig. 7): Socia circular. The lower lobe of valva very slightly S-shaped, robust. Tergal lobes C-shaped, very broad, with base reducing gradually in proximal part. Distal processes of vinculum separated, almost straight, slightly curved apically, with bases separated. Aedeagus short and robust, with distinctly pointed apex and dorso-lateral opening of vesica supplied by a low toothed crest. VIII sternite becomes narrow caudally, without cut.

♀ genitalia (fig. 16): Antevaginal plate high, weakly sclerotized, without pockets; postvaginal plate medium broad, without distinct medial narrowing and with slightly wrinkled outer edge. Ostium deep, sclerotized, with transversal dorsal pockets; bursa copulatrix with distinct ovoid scobination and smaller diffuse signum without lateral spines.

Bionomics. The subspecies seems to be bivoltine; moths have been recorded from late March to early July and again in mid October - mid November. They inhabit altitudes of 300-1400 m. The eggs hibernate (in mountain range). *Bambusa* and *Phragmites* were reported by CHANG as hosts (1989: 199) but this information needs confirmation and seems to be erroneous.

**Distribution:** Taiwan.

**Etymology:** The subspecies is dedicated to ARINA, the girl-friend of the junior author.

Populations of Java and Bali were included by DE LAJONQUIÈRE (1978) in a type series of *Euthrix laeta austrina* LAJ. - they are described here as a new species together with a new subspecies.

*Euthrix morra* spec. nov. (colour plate 12: 18, 19)

Holotype ♂ (colour pl. 6: 19): Central Bali, Bedugul District, Tamblingan N. P., 1200 m, 08°14'S; 115°08'E, XI.2004, leg. St. JAKL (MWM).

Paratypes: 1 ♂, Indonesien, W-Bali, Titap, Papuan rainfor., 8°25'N; 114°58'E, 550 m, 29.-30.I.1998, leg. JAKL, CERVENKA & SCHINTLMEISTER (MWM); 7 ♂♂, 2 ♀♀, Central Bali, Bedugul District, Tamblingan N. P., 1200 m, 08°14'S; 115°08'E, XI 2004, leg. St. JAKL (MWM); 3 ♂♂, Central Bali, Bedugul District, Tamblingan N. P., 1200 m, 08°14'S; 115°08'E, I.-II.2004, leg. St. JAKL (MWM).

**Description:** Wing span 45-47 mm in ♂♂ and 51-54 mm in ♀♀, and fore wing length correspondingly 22-24 and 26-28 mm. More robust and much darker in comparison with *E. laeta* (WLK.) Ground colour dark brown to chocolate brown, with yellowish cubital and anal field. External margin rose brown with yellowish suffusion. Postmedial fascia black, diagonal, almost straight, meeting with antemedial in anal field. Discal spots rounded, of brownish yellow colour; sometimes the lower one pure white. Hind wings light brown.

♂ genitalia (fig. 8): Uncus and gnathos reduced. Socia distinct, membranous to very weakly sclerotized, with long setae, taking a lateral position on tegument. Valvae strongly modified, heavy sclerotized, divided into two narrow tubular lobes; the lower one broader, with widened base, almost straight and only with a distal part slightly curved; and the upper one stick-shaped, slightly S-shaped, shorter than in *E. laeta* (WLK.). Tergal lobes long, flattened, band-shaped, strongly serrate along outer margin. Vinculum narrow, semi-circular; distal processes of vinculum paired, fork-shaped, S-curved, with bases moved apart and looking like an oven fork. Aedeagus slender, heavy sclerotized, C-shaped, shorter than in *E. laeta*, with shorter pointed apex and lateral (left) opening of vesica supplied by a low and narrow toothed crest. Vesica short without any cornuti. VIII sternite is also slightly modified, higher than in *E. laeta* (WLK.), with distinct triangular caudal cut forming characteristic sternal lobes.

♀ genitalia (fig. 18): Papilla analis short, of domed form; apophysis posterioris thin and long, much longer (x 10-12) than apophysis anterioris. Both vaginal plates weak. Antevaginal plate small, triangular, hardly visible, without any cut, pocket or fold; postvaginal plate looks like a narrow arched folded band roof above ostium. Ostium not so deep as in *E. laeta* (WLK.), sclerotized; anthrum strongly sclerotized, hemispherical, transversal, with broad slit. Ductus bursae short but distinct, sclerotized, bursa copulatrix pear-shaped, with caudal scobination but without signum.

**Bionomics:** This species seems to be not rare at the altitudes of 300-1200 m and was observed from January, February and November. Nothing is known about the larval host plants. **Distribution** (map 3): Seems to be endemic to Bali.

**Etymology.** Morra (from Swedish Mårran) - a dark but attractive ghost from Tuve (Tove) JANSSON's stories on Trolls of Mumidol ('Trollkarlens hatt', 'Trollvinter', etc).

The population of Java is described here as a distinct subspecies.

*Euthrix morra floyana* **subspec. nov.** (colour plate 12: 20)

Holotype: ♂, Ost-Java, Meru Betiri National Park, 25 km S Dorf Kalibaru, 300-500 m, V.-VI.1996 (MWM).

Paratypes: 4 ♂♂, Ost-Java, Meru Betiri, National Park, 25 km S Dorf Kalibaru, 300-500 m, V.-VI.1996 (MWM); 2 ♂♂, Java or., Mt. Bahran, 600-1000 m, IV.1996 (MWM); 2 ♂♂, Java occ., Gede, 1250 m, Pangrango Nat. Park, 6°47'S; 107°E, IV.-VI.1996 (MWM); 1 ♂, Indonesia, C. Java, Mt. Muria, 15 km N Kasdas, 6°35'N; 110°53'E, 1.100 m, 21-22.I 1998, leg. JAKL, SCHINTLMEISTER & CERVENKA (MWM); 1 ♂, Indonesien, West Java, Mt. Salak, 6°42'S; 106°44'E, 1000-1500 m, VII.1996 (MWM); 2 ♂♂, paratypes of *austrina* LAJ., Kletak Tengger, E. Java, 6000', VI.1934, J. P. A. KALIS (gen. slide BMNH Lasio 863); 3 ♂♂, paratypes of *austrina* LAJ., Djoenggo Arjoeno, E. Java, VI.1934, 4500', J. P. A. KALIS (BMNH); 1 ♀, paratype of *austrina* LAJ., Java, HORSF[IELD]. (BMNH); 1 ♂, paratype of *austrina* LAJ., West Java, Perbawatie, Mt. Gede, 4-4500 ft, I.1938 (BMNH).

**Description:** Smaller; wing span 39-41 mm in ♂♂ and 50-52 mm in ♀♀, and fore wing length correspondingly 20-22 and 25 mm. Fore wings narrower; general colouration lighter. Ground colour dark yellow brown, with yellowish cubital, anal and external fields. Discal spots ovoid, brownish in ♂♂ and white with brown suffusion in ♀♀. Postmedial fascia is dark grey.

♂ genitalia (fig. 9): Similar to those of the nominate subspecies but tergal lobes wider and distal processes slender and finer.

♀ genitalia: Not examined so far.

**Bionomics:** This subspecies seems to be not rare all over the island at the altitudes of 300-1800 m and moths were observed from January and from April to July, so it develops two or probably more generations. Nothing is known about larval the host plants.

**Distribution** (map 3): Java.

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